

IN THE SPECIFICATION

Page 1, between the title of the invention and the first line of the text, insert the following:

CROSS-REFERENCE TO RELATED APPLICATION

This Application is a Section 371 National Stage Application of International Application No. PCT/FR2004/000958, filed April 16, 2004 and published as WO 2004/095791 A1 on November 4, 2004, not in English.

FIELD OF INVENTION

Page 1, after line 4, insert the following heading:

BACKGROUND OF THE INVENTION

Page 3, after line 27, insert the following heading:

SUMMARY OF THE INVENTION

Please replace the paragraph appearing on page 3, lines 27-28, with the following amended paragraph:

One particular purpose of an embodiment of the invention is to overcome these disadvantages in prior art.

Please replace the paragraphs appearing on page 4, lines 1-12, with the following amended paragraphs:

More precisely, one purpose of an embodiment of the invention is to provide a technique for transmission of radio data using a multicarrier modulation with distributed pilots in which interference between pilots is less than with techniques in prior art.

Another purpose of an embodiment of the invention is to use such a technique that consequently improves receiver performances, and particularly in which the estimating quality of the radio mobile transmission channel is better than with techniques according to prior art.

Another purpose of an embodiment of the invention is to provide such a technique that is simple and inexpensive to implement. In particular, the purpose of the invention is to implement such a technique that does not require the use of complex and expensive calculations in terms of resources, to reduce interference affecting the pilots.

Please replace the paragraph appearing on page 4, lines 13-19, with the following amended paragraph:

~~These objectives and others that will become clear later are achieved using~~ One embodiment of the invention relates to a process for transmission of radio data between at least two emitters and a receiver, using at least one multicarrier data transmission signal. The multicarrier signal is formed from a sequence in time of symbols built firstly with information data elements, and secondly with reference elements called pilots, distributed within the said information data elements according to a predetermined pattern and for which the value during emission is known to the said receiver.

Please replace the paragraph appearing on page 4, lines 20-23, with the following amended paragraph:

According to an embodiment of the invention, at least two of the said emitters use distinct pilot patterns, such that at any given moment and at any given frequency, the said receiver can only receive one pilot from the said emitters.

Please replace the paragraph starting on page 4, line 24, and ending on page 5, line 3, with the following amended paragraph:

Thus, an embodiment of the invention is based on a totally novel and inventive approach to radio data transmission by multicarrier modulation with distributed pilots. The

~~invention~~embodiment advantageously uses the fact that the receiver directly or indirectly knows the source of the data that it receives (for example in the case of a cellular radio communication network, the receiver has information about the base station that sent the data that it receives). Therefore, the ~~invention~~embodiment proposes to attribute different pilot patterns to some emitters in the radio communication system considered, for example such that two nearby emitters do not emit two distinct pilots that could be received by the same receiver at the same time and at the same frequency. Thus, a network receiver can only receive a single pilot at a given instant and at a given frequency.

Please replace the paragraphs appearing on page 6, lines 16-21, with the following amended paragraphs:

~~The~~ An embodiment of the invention also uses the fact that the receiver directly or indirectly knows the source of the data that it receives by reference to a control information transmission signal.

~~The~~ An embodiment of the invention also relates to a method of receiving data transmitted according to the previously described transmission method, comprising a step to determine the pilot pattern used by the emitter of the said data.

Please replace the paragraphs appearing on page 7, lines 20-31, with the following amended paragraphs:

~~The invention also~~ A further embodiment of the invention relates to a cellular radio communication system comprising at least two emitters and one receiver, using at least one multicarrier data transmission signal. The multicarrier signal is formed from a time sequence of symbols composed firstly of information data elements and secondly of reference elements called pilots distributed within the said information data elements according to a predetermined pattern (in other words,

the symbols are composed of information data elements and pilots) and for which the value on emission is known to the said receiver.

According to an embodiment of the invention, at least two of the said emitters comprise means of generating distinct pilot patterns, such that only one pilot can be received by the said receiver from the said emitters, at a given time and at a given frequency.

Please replace the paragraphs appearing on page 8, lines 1-17, with the following amended paragraphs:

~~The invention also~~ A further embodiment of the invention relates to a base station of a cellular radio communication system comprising means of emitting data transmitted according to the previously described transmission method, comprising means of generating a pilot pattern using the generation function using an identifier of the said base station as a parameter, such that two base stations with distinct identifiers generate two equally distinct pilot patterns.

~~The invention also~~ Another embodiment of the invention relates to a cellular radio communication system comprising means of receiving data transmitted according to the previously described transmission method, comprising:

- means of receiving data transmitted by the said multicarrier data transmission signal;
- means of identifying the emitter that emitted the said data;
- means of determining the said pilot pattern used by the said emitter.

Other characteristics and advantages of one or more embodiments of the invention will become clear after reading the following description of a preferred embodiment given as a simple illustrative and non-limitative example, and the attached drawings. ~~among which:~~

Please add new paragraph on page 8, after line 29:

- Figure 5 shows an example of a cellular radio communication network to which one or more embodiments of the present invention can be applied.

Page 8, after line 17, insert the following heading:

BRIEF DESCRIPTION OF THE DRAWINGS

Page 9, before line 1, insert the following heading:

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

Please replace the paragraph appearing on page 9, lines 1-3, with the following amended paragraph:

The general principle of an embodiment of the invention is based on the proprietary assignment of pilot patterns to different emitters in a radio communication system using a multicarrier modulation with distributed pilots.

Please replace the paragraph appearing on page 9, lines 20-24, with the following amended paragraph:

However according to an embodiment of the invention and as shown in Figure 2, it is planned to assign distinct pilot patterns to different emitters in the radio communication network considered. For example, a different pilot pattern could be assigned to each emitter in the network, such that a given pilot pattern is associated with a single emitter, or base station, in the network.

Please replace the paragraph appearing on page 11, lines 1-3, with the following amended paragraph:

Figure 3 shows an example distribution of pilot patterns references 20 to 22 in Figure 2 in the context of a conventional cellular radio communication network to which an embodiment of the invention is applicable.

Please replace the paragraph appearing on page 11, lines 9-10, with the following amended paragraph:

Obviously, one or more embodiments of the invention ~~is~~are equally applicable to any other type of radio communication network comprising a plurality of sources emitting signals.

Please replace the paragraph appearing on page 12, lines 3-4, with the following amended paragraph:

Obviously, one or more embodiments of the invention ~~is~~are equally applicable to any other type of radio communication network containing a plurality of sources emitting signals.

Please replace the paragraphs appearing on page 12, line 24 to page 13, line 2, with the following amended paragraphs:

According to an embodiment of the invention, it is arranged such that the location of a zero energy element 12_1 of the first signal in the time - frequency space coincides with the position of the pilot 11_6 of the second signal in time and frequency. Similarly, the position in time and frequency of zero energy elements 12_2 , 12_3 of the second signal is chosen to be identical to the position of the corresponding pilots 11_4 , 11_5 in the first signal.

Therefore, the pilot 11_6 received by a receiver located in the cell ~~30~~ 30_1 is not subject to any interference from the signals emitted by emitters in adjacent cells, and particularly cell 30_2 , since the emitter 31_2 emits a symbol with practically zero energy at the same time and at the same frequency.

Please replace the paragraphs appearing on page 13, lines 5-14, with the following amended paragraphs:

An embodiment of the invention also relates to reception of data transmitted using the transmission method described above, as illustrated in Figure 5 for example.

According to the ~~invention~~embodiment, a receiver 34₁ receives only one pilot emitted by one of the emitters 31₁ and 31₂, at a given time and at a given frequency. Therefore the interference affecting a pilot received by this receiver is due solely to useful carriers emitted at the same time and at the same frequency by neighbouring emitters.

In terms of reception, in a first operating mode, the receiver 34₁ detects the multicarrier data transmission signal and the control information emission signal. It then implements several steps:

Please replace the paragraph appearing on page 13, lines 21-23, with the following amended paragraph:

In a second operating mode, the receiver 34₁ detects the multicarrier data transmission signal, but does not detect the control information transmission signal. It then implements several steps:

Please replace the paragraph appearing on page 13, line 29, to page 14, line 2 with the following amended paragraph:

According to this second operating mode, a receiver 34₁ located in a first cell 30₁ in the radio communication network according to the invention is considered, receiving signals emitted by a first emitter 31₁ in the first cell 30₁ and at the same time by a second emitter 31₂ in a second nearby cell 30₂, the receiver 34₁ knowing the different possible symbol patterns emitted by different emitters.

Please replace the paragraph appearing on page 14, line 5-9 with the following amended paragraph:

According to this second operating mode, the receiver 34₁ can detect the presence of the second emitter 31₂ and demodulate information sent by this second emitter in a multicarrier data transmission signal, even if it does not receive any additional information about the pilot pattern used by this second emitter, in other words blind or without knowledge of control information.

Please replace the paragraph appearing on page 15, lines 23-25, with the following amended paragraph:

Therefore, the technique according to an embodiment of the invention enables an efficient reduction of interference affecting the pilots without the need for an additional calculation on information data elements and pilots.